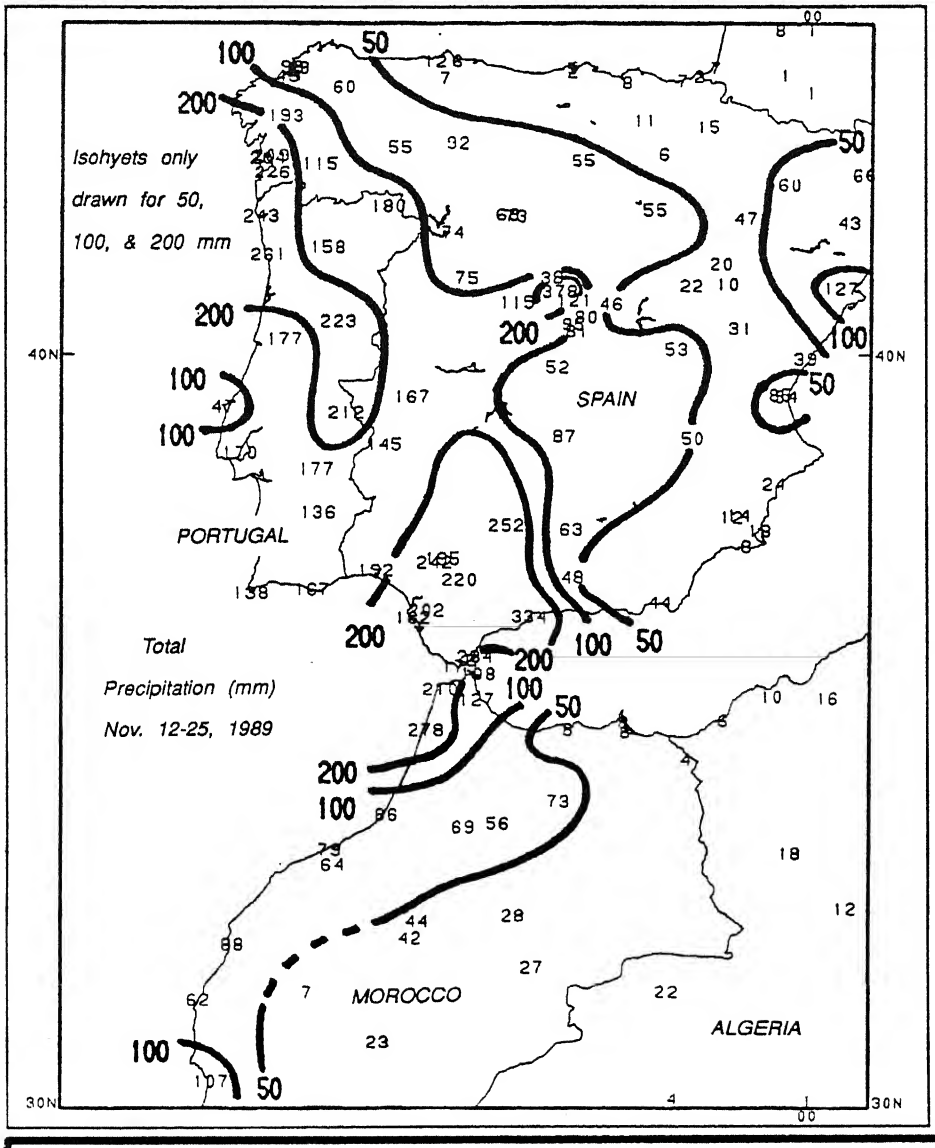
CLIMATE ANALYSIS CENTER

CONTAINS:
SUMMARY ON DRYNESS IN CENTRAL UNITED STATES

WEEKLY CLIMATE BULLETIN

No. 89/47 **Washington, DC** **November 25, 1989**



TORRENTIAL RAINS DURING THE PAST TWO WEEKS HAVE INUNDATED PORTIONS OF SOUTHERN AND EASTERN SPAIN AND NORTHERN MOROCCO. THE COPIOUS PRECIPITATION SINCE MID-NOVEMBER HAS CAUSED THE LOSS OF SEVERAL LIVES AND EXTENSIVE PROPERTY DAMAGE. ONE OF THE HARDEST HIT AREAS WAS THE MEDITERRANEAN PORT OF MAGALA, SPAIN. UP TO 334 MM (13.15 INCHES) OF RAIN, MUCH OF IT FALLING THIS WEEK, HAS PUSHED RIVERS OVER THEIR BANKS, AND FLOOD WATERS HAVE REACHED DEPTHS OF 1 METER (3.3 FEET) IN SOME PARTS OF THE CITY. IN COMPARISON, APPROXIMATELY 25 MM (1 INCH) OF RAIN NORMALLY OCCURS AT MAGALA DURING THIS TWO WEEK PERIOD.

UNITED STATES DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL WEATHER SERVICE – NATIONAL METEOROLOGICAL CENTER

CLIMATE ANALYSIS CENTER

WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- U.S. cooling degree days (summer) or heating degree days (winter).
- Global two-week temperature anomalies.
- Global four-week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three-month precipitation anomalies (once a month).
- Global twelve-month precipitation anomalies (every three months).
- Global three-month temperature anomalies for winter and summer seasons.
- Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF NOVEMBER 25, 1989

1. Alaska and Canada:

BITTERLY COLD AIR SHIFTS SOUTHEASTWARD.

The dome of arctic-like temperatures which had dominated Alaska and northwestern Canada moved into southern Canada this week. Average temperatures plunged to nearly 12°C below normal values in Manitoba while Alaska noted only a slight increase in average temperatures from the previous week [4 weeks].

2. Southern Great Plains:

LITTLE PRECIPITATION NOTED.

During the past 70 days, many areas of Kansas and Oklahoma have measured less than 10 mm. Coupled with the little to no precipitation recorded during the past week and the upcoming normally-dry winter season, limited relief is immediately foreseen (see Special Climate Summary) [10 weeks].

3. Southwestern Europe:

TEMPERATURES REMAIN ABOVE NORMAL.

Departures of as much as +5°C were observed as warm conditions dominated the region [6 weeks].

4. Portugal and Southwestern Spain:

A SECOND WEEK OF HEAVY RAINS.

Flooding casualties were reported as rainfall intensified over portions of the Iberian Peninsula where 80 to 150 mm had fallen during the previous week. Malaga, Spain suffered the most damage when nearly 244 mm inundated the Mediterranean port city while reports of 100 to 200 mm were common elsewhere (see Front Cover) [Episodic Event].

5. Eastern China and the Korean Peninsula:

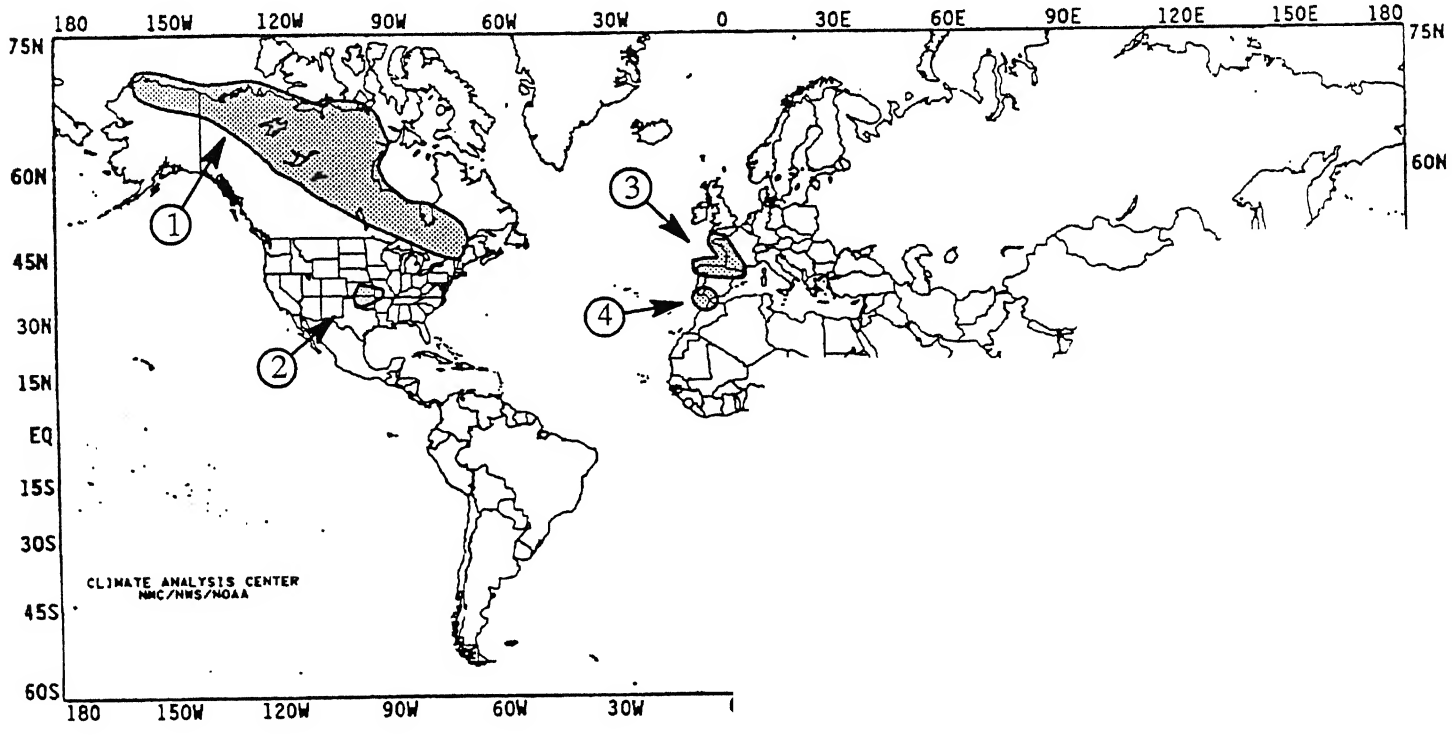
EXCESSIVE MOISTURE DIMINISHES.

Cool, dry weather invaded Eastern Asia, easing wet conditions as little to no precipitation was observed across Korea [Ended at 6 weeks] and the eastern Yangtze River Valley [Ended at 4 weeks].

6. Northeastern Australia:

TURNING WET.

A general increase in rainfall in Queensland has created anomalous wet conditions in the area. Some heavy rains occurred recently, with as much as 354 mm recorded at one station while numerous locales noted 120 to 180 mm [4 weeks].



EXPLA

TEXT: Approximate duration of anomalies is in brackets. Precip
MAP: Approximate locations of major anomalies and episodic eve
temperature anomalies, four week precipitation anomalies, long-

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF NOVEMBER 19 THROUGH NOVEMBER 25, 1989

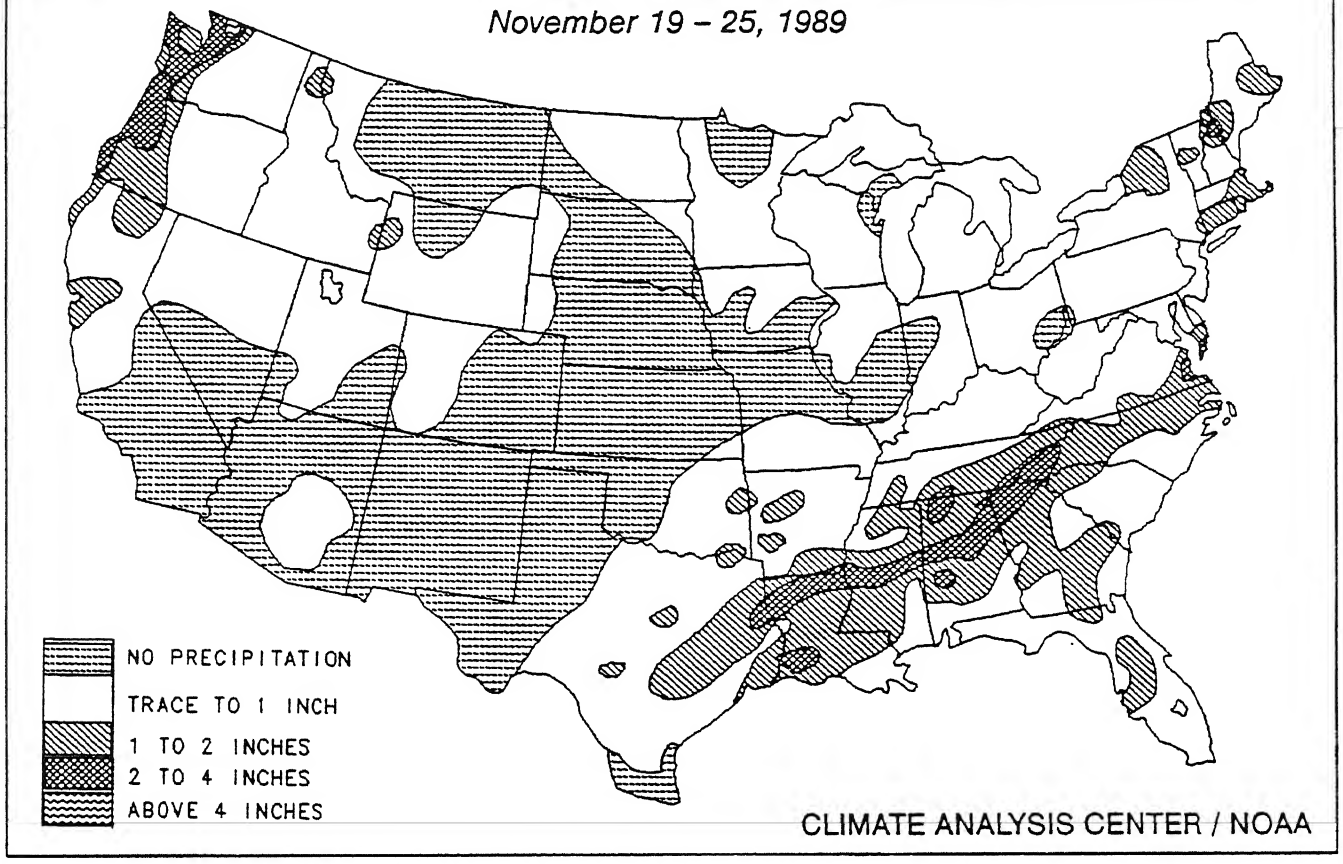
Mild and dry weather dominated the western U.S. from the Intermountain West to the Great Plains for the third consecutive week while extreme cold and early-season snows occurred in the Northeast. The week commenced with warm, spring-like conditions covering the Eastern Seaboard. The warmth, however, was short-lived as a strong cold front positioned across the upper Midwest and Great Lakes on Monday rapidly advanced southeastward throughout the eastern third of the nation by late Tuesday. As the front passed, powerful northwesterly winds, gusting up to 87 mph, battered parts of the Northeast and mid-Atlantic. Numerous trees and power lines were downed while temperatures dropped as much as 20°F in an hour. A low pressure center rapidly intensified along the northern portion of the front as it pushed into the Atlantic Ocean and produced blizzard conditions in northern New England. Parts of eastern Maine were buried under a foot of snow which was accompanied by gale-force winds and near-zero visibilities. Behind the front, several stations in the Northeast set new daily minimum temperature records. As these cold winds blew across the open waters of the Great Lakes, heavy lake-effect snows blanketed the snow belt regions with up to twelve inches. Farther west, a weakening Pacific storm dropped moderate amounts of precipitation on the Pacific Northwest. By mid-week, cold air became firmly entrenched in the Northeast while a storm system developed in the lower Mississippi Valley. Showers and thunderstorms were reported across the Southeast while light snow fell on the Tennessee and Ohio Valleys and the central Appalachians. The storm system rapidly intensified in the Southeast and moved northeastward. An abundant moisture supply coupled with extremely cold air generated a typical East Coast snow storm. Four to eight inches of snow fell in a band from Washington, DC to Boston, MA before the storm moved out to sea. New York City observed its first white Thanksgiving in 50 years, and several locations recorded the snowiest Thanksgiving ever. Portions of the southeastern New England Coast were buried under a foot and a half of snow. In the storm's wake, additional cold air blasted the East and exacerbated snow removal. Elsewhere, most of the West continued experiencing mild and dry weather, but another storm moved into the Pacific Northwest and generated heavy rains along the Washington and Oregon coasts. Precipitation amounts generally decreased to the south and east of this area, but snow falling in the Cascades and the northern Rockies became heavy by late Saturday. In Alaska, bitterly cold air finally departed much of the state, but a few stations in the north recorded weekly temperatures averaging up to 15°F below normal. Moderate to heavy rainfall accompanied near normal temperatures along the south-central and southeastern coasts, but most Alaskan locations generally reported little or no precipitation. With the exception of heavy showers at Kokee, Kauai early in the week, seasonable temperatures and exceptionally dry weather were observed in Hawaii.

According to the River Forecast Centers, most of the Far West and the eastern third of the nation received some precipitation last week, but very few areas measured heavy amounts (more than 2 inches) in the contiguous United States. The greatest weekly totals (between 2 and 4 inches) occurred along the Pacific Northwest Coast and from extreme eastern Texas northeastward to the southern Appalachians (see Table 1). Localized thunderstorms dumped over 5 inches of rain on Key West, FL and just to the northeast of Corpus Christi, TX. Light to moderate amounts were observed along the northern two-thirds of the Pacific Coast, in the northern half of the Intermountain West, the central Rockies, the southern Great Plains, portions of the northern Great Plains and upper Midwest, and throughout the eastern third of the country. Little or no precipitation fell on the southern thirds of the Pacific Coast, the Intermountain West, and the Rockies, and throughout the Missouri and middle Mississippi Valleys and the central Plains (additional information on the latter three regions' extreme dryness since mid-September is enclosed in this week's Special Climate Summary).

Unseasonably mild conditions continued across the western half of the U.S., in some areas for the third consecutive week, as temperatures averaged between 9°F and 13°F above normal in the northern and central Rockies (see Table 2). Most of the country west of the Mississippi River recorded near or above normal weekly temperatures. Early in the week, several stations tied or set new daily maximum temperature records in the Far West and in parts of the nation's midsection, but highs above 80°F were limited to the extreme southern sections of the country (see Figure 1). In sharp contrast, bitterly cold Arctic air covered the eastern third of the nation as the greatest negative departures (between -10°F and -16°F) were found along the northern half of the East Coast and throughout New England (see Table 3). In addition, snow cover and radiative cooling helped to drop the mercury to record lows at many locations in the mid-Atlantic and New England during the latter half of the week. Subzero temperatures were reported in the northern Great Plains, upper Midwest, and northern New England while readings in the teens were reported as far south as central Oklahoma and the southern Appalachians (see Figure 2).

TABLE 1. Selected stations with 2.00 or more inches of precipitation for the week.

STATION	TOTAL (INCHES)	STATION	TOTAL (INCHES)
KEY WEST, FL	6.33	EUGENE, OR	2.58
KEY WEST NAS, FL	4.72	CORDOVA/MILE 13, AK	2.52
YAKUTAT, AK	3.90	KOKEE, KAUAI, HI	2.43
QUILLAYUTE, WA	3.69	SHREVEPORT, LA	2.21
MT. WASHINGTON, NH	3.45	HAMPTON/LANGLEY AFB, VA	2.09
SHREVEPORT/BARKSDALE AFB, LA	3.11	KODIAK, AK	2.06
ANNETTE ISLAND, AK	3.03	VIRGINIA BEACH/OCEANA NAS, VA	2.02
NORTH BEND, OR	2.72		


OBSERVED PRECIPITATION
November 19 – 25, 1989
NO PRECIPITATION
TRACE TO 1 INCH
1 TO 2 INCHES
2 TO 4 INCHES
ABOVE 4 INCHES
CLIMATE ANALYSIS CENTER / NOAA

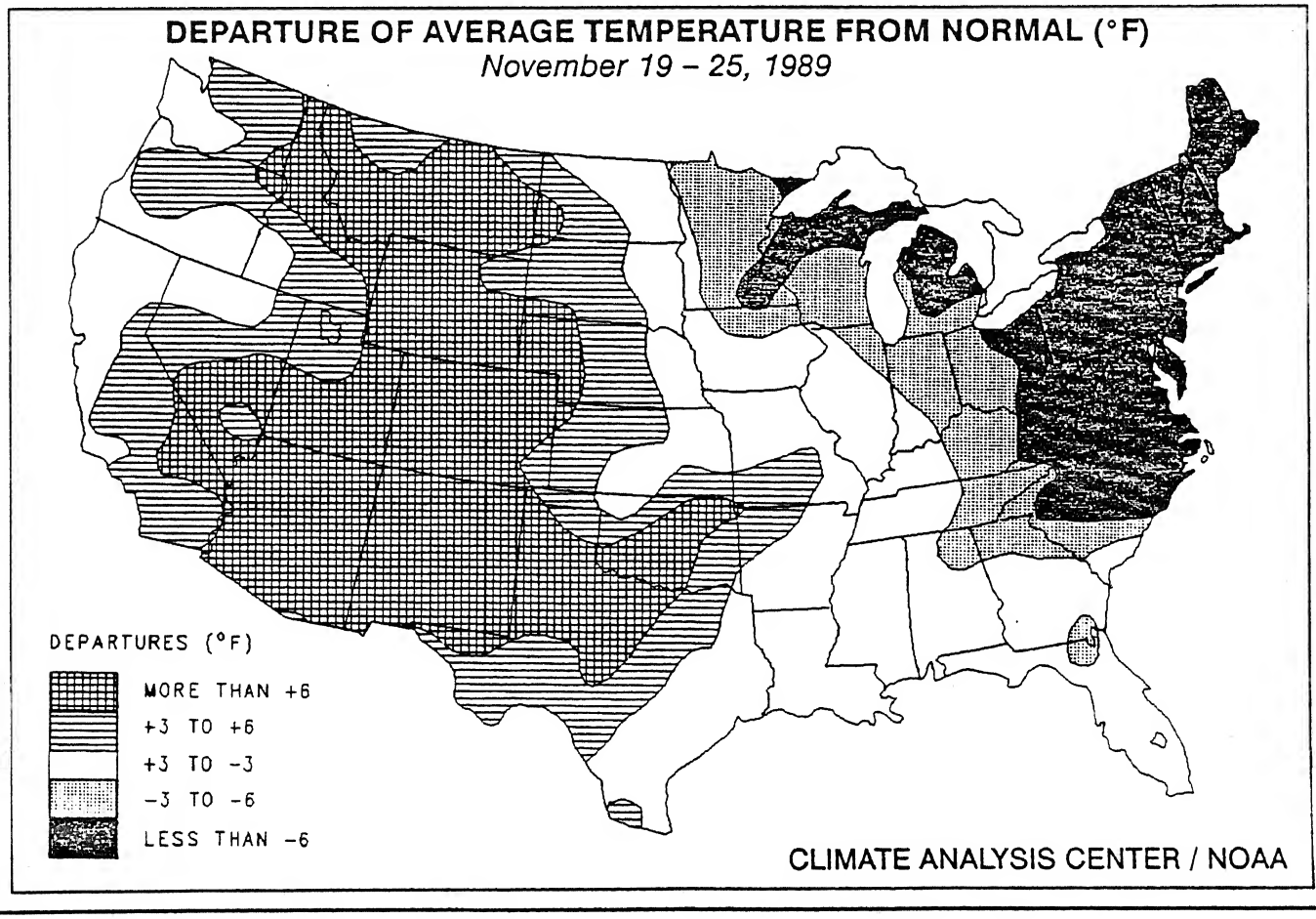

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)
November 19 – 25, 1989
DEPARTURES (°F)
MORE THAN +6
+3 TO +6
+3 TO -3
-3 TO -6
LESS THAN -6
CLIMATE ANALYSIS CENTER / NOAA

TABLE 2. Selected stations with temperatures averaging 8.0°F or more ABOVE normal for the week.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
LARAMIE, WY	+12.6	39.4	CHEYENNE, WY	+9.3	42.1
LANDER, WY	+12.1	40.1	BILLINGS, MT	+9.1	41.5
VICTORVILLE/GEORGE AFB, CA	+11.4	58.6	MILES CITY, MT	+9.0	37.8
AKRON, CO	+11.2	44.7	SIDNEY, NE	+8.9	41.1
BLANDING, UT	+10.7	46.5	MISSOULA, MT	+8.9	38.6
ROCK SPRINGS/SWEETWATER,WY	+10.7	38.0	EAGLE, CO	+8.9	36.6
BUTTE, MT	+10.6	35.5	LEWISTOWN, MT	+8.8	38.1
DENVER, CO	+10.4	46.7	ROSWELL, NM	+8.7	53.4
CASPER, WY	+10.2	40.5	CEDAR CITY, UT	+8.5	45.1
PHOENIX, AZ	+9.8	67.9	WORLAND, WY	+8.5	36.0
BOZEMAN, MT	+9.7	37.2	PRESCOTT, AZ	+8.2	50.1
LEWISTON, ID	+9.6	47.8	FORT COLLINS, CO	+8.1	42.6
COLORADO SPRINGS, CO	+9.6	44.7	LAS VEGAS, NV	+8.0	58.9
GLENDALE/LUKE AFB, AZ	+9.4	65.8	CODY, WY	+8.0	39.9
TRINIDAD, CO	+9.4	47.4			

TABLE 3. Selected stations with temperatures averaging 10.0°F or more BELOW normal for the week.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
HOULTON, ME	-16.2	13.1	MONTPELIER, VT	-11.0	20.6
BARTER ISLAND, AK	-14.7	-17.4	POUGHKEEPSIE, NY	-11.0	27.4
MT. WASHINGTON, NH	-14.2	3.8	WRIGHTSTOWN/MCGUIRE AFB, NJ	-10.9	32.9
EASTPORT, ME	-13.3	23.7	ROCHESTER, NY	-10.7	27.4
CARIBOU, ME	-12.9	15.3	HARTFORD, CT	-10.7	28.4
BARROW, AK	-12.8	-16.7	BRIDGEPORT, CT	-10.7	32.2
AUGUSTA, ME	-12.7	22.2	CONCORD, NH	-10.6	23.9
WORCESTER, MA	-12.6	24.3	PORTLAND, ME	-10.6	25.4
BANGOR, ME	-12.5	21.5	ISLIP, NY	-10.5	31.1
BINGHAMTON, NY	-11.6	23.9	NEWARK, NJ	-10.4	33.7
BOSTON, MA	-11.6	30.9	PROVIDENCE, RI	-10.3	30.9
ATLANTIC CITY, NJ	-11.4	32.6	BRADFORD, PA	-10.1	23.2
SALISBURY, MD	-11.3	34.3	CHATHAM, MA	-10.1	32.9
HAMPTON/LANGLEY AFB, VA	-11.2	38.0	WILKES-BARRE, PA	-10.0	28.3
MILLVILLE, NJ	-11.1	32.6	DOVER AFB, DE	-10.0	34.4

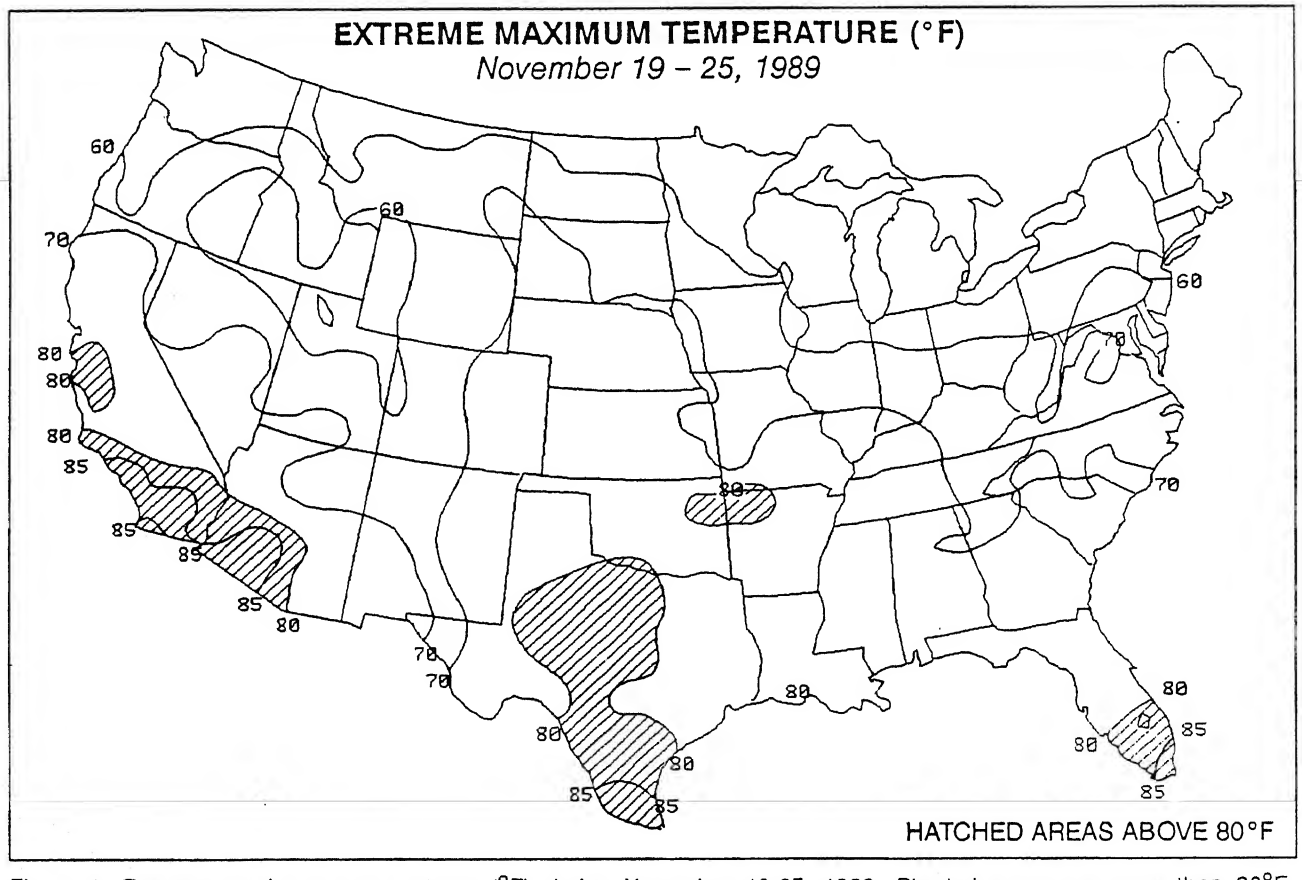


Figure 1. Extreme maximum temperatures (°F) during November 19-25, 1989. Shaded areas are more than 80°F, and isotherms are only drawn for 60°F, 70°F, 80°F, and 85°F. Early in the week, unseasonably warm air covered the Far West and the nation's midsection as several locations set new daily maximum temperature records. Farther east, temperatures in the mid-Atlantic rose into the sixties and seventies before bitterly cold air invaded the region late on Tuesday and kept highs in the thirties and forties during the remainder of the week.

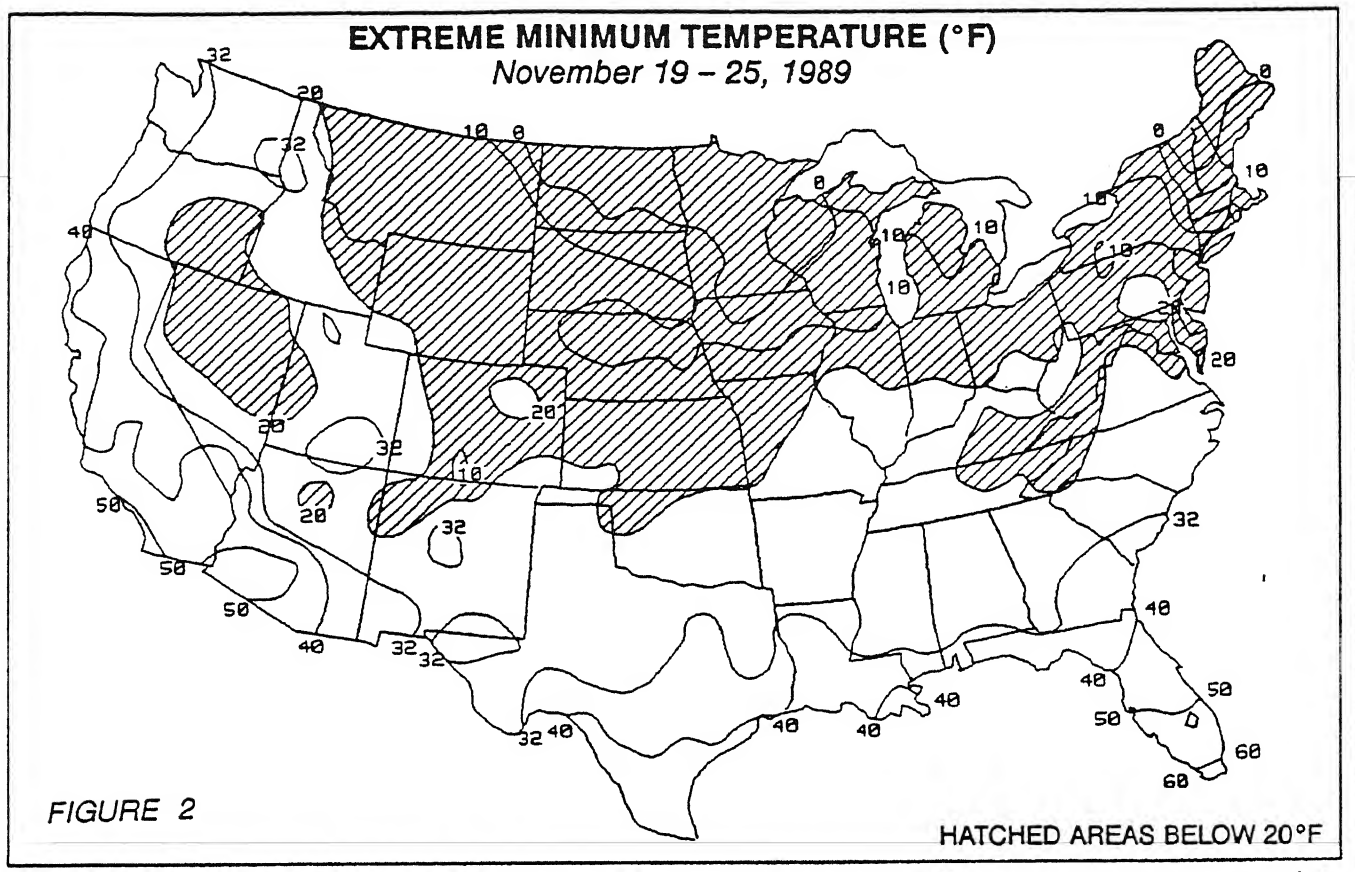
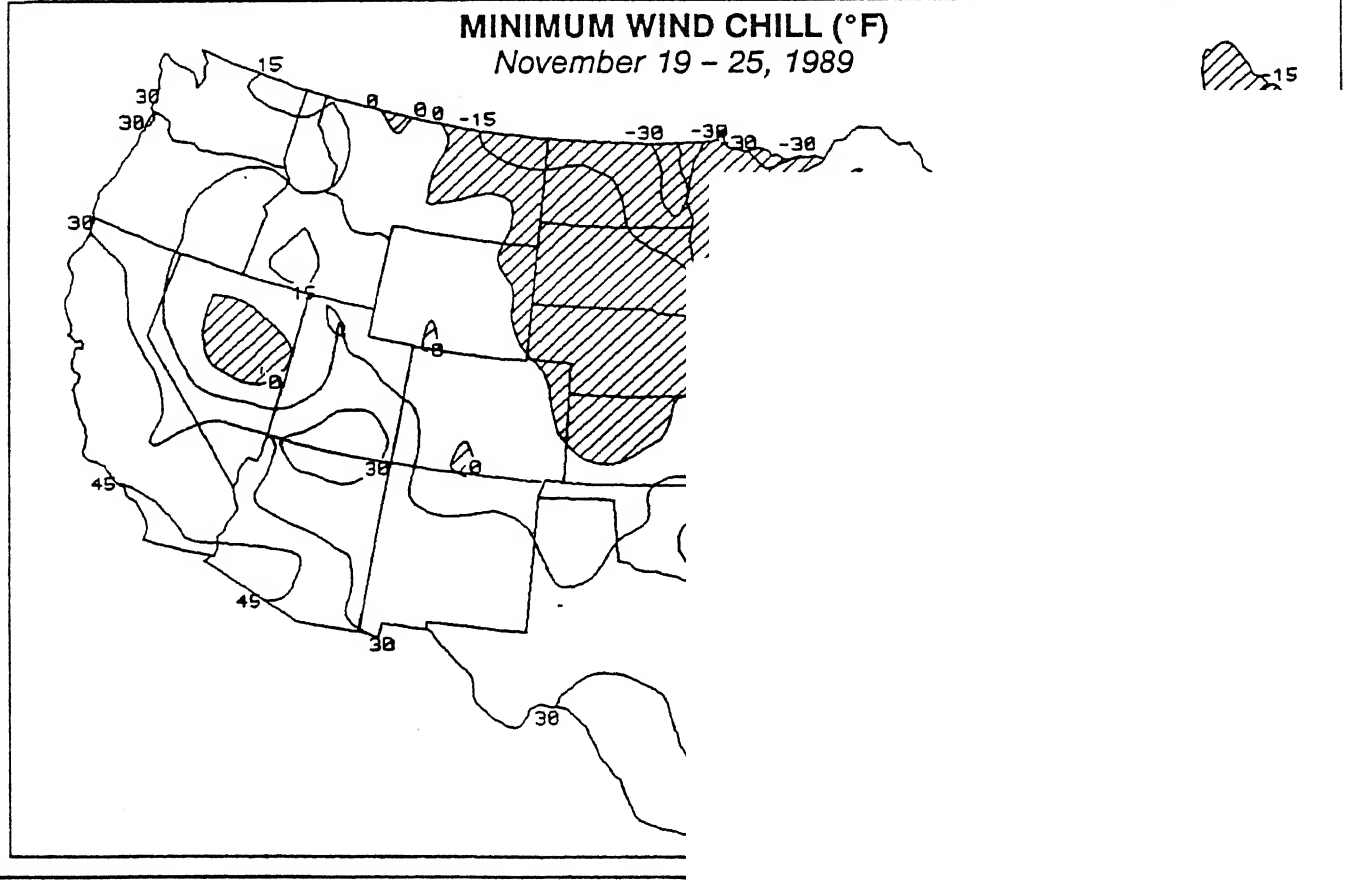
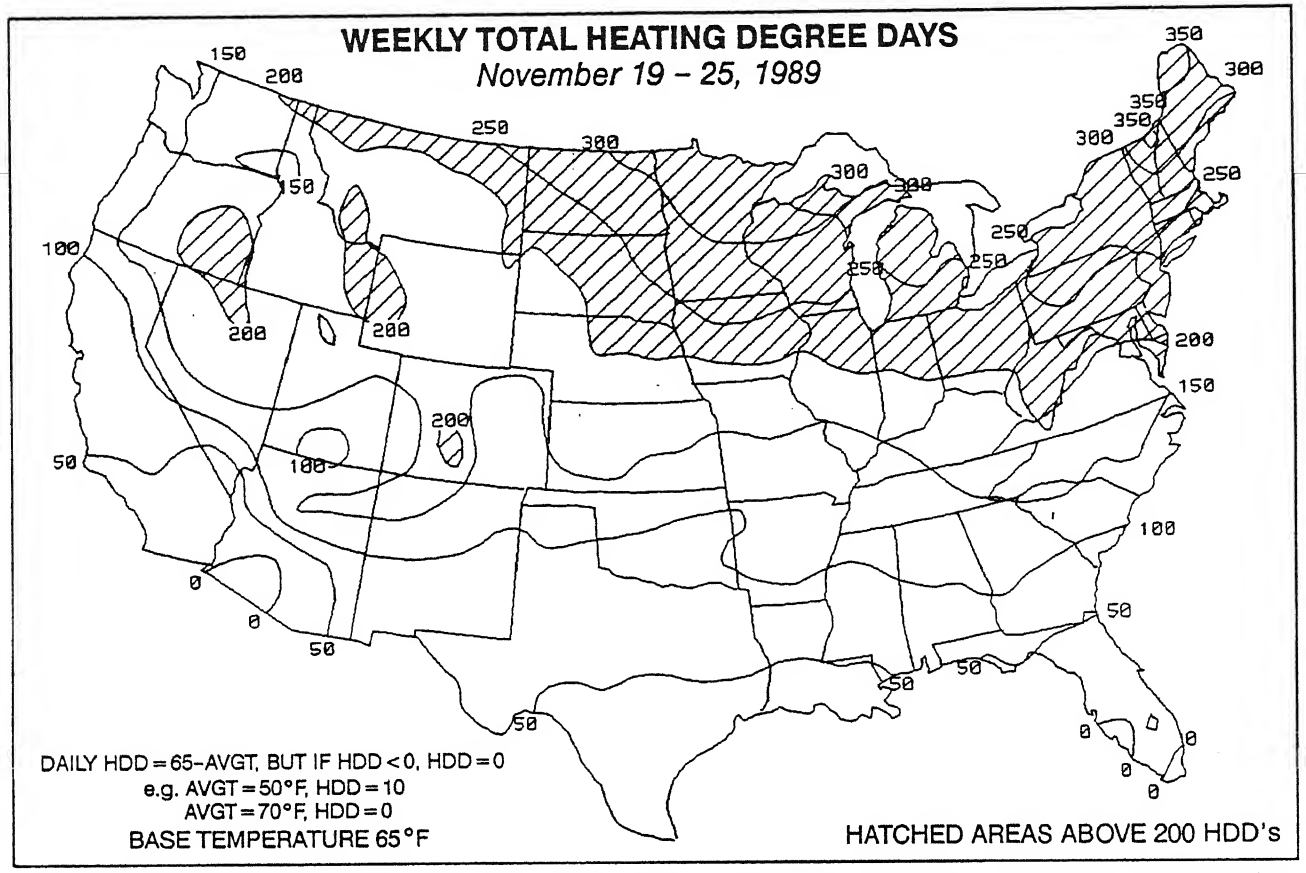


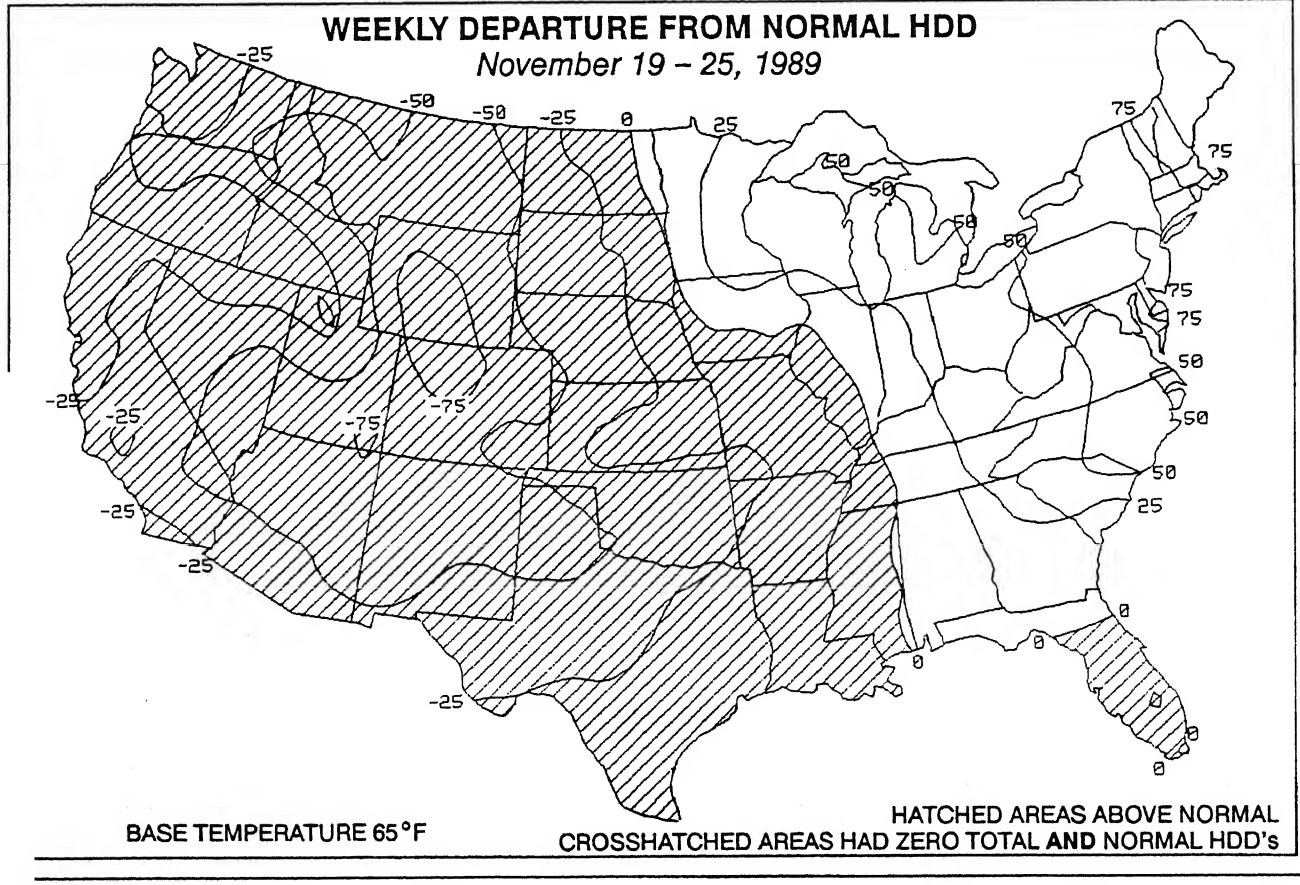
FIGURE 2

Frigid Arctic air invaded the north–central U. S. early in the week and eventually pushed into the Northeast during the latter half of the week as several stations in both areas recorded readings near or below 0°F (top). Very low temperatures and winds produced extremely dangerous wind chills (less than -20°F) in the northern Great Plains, upper Midwest, and northern New England (bottom).

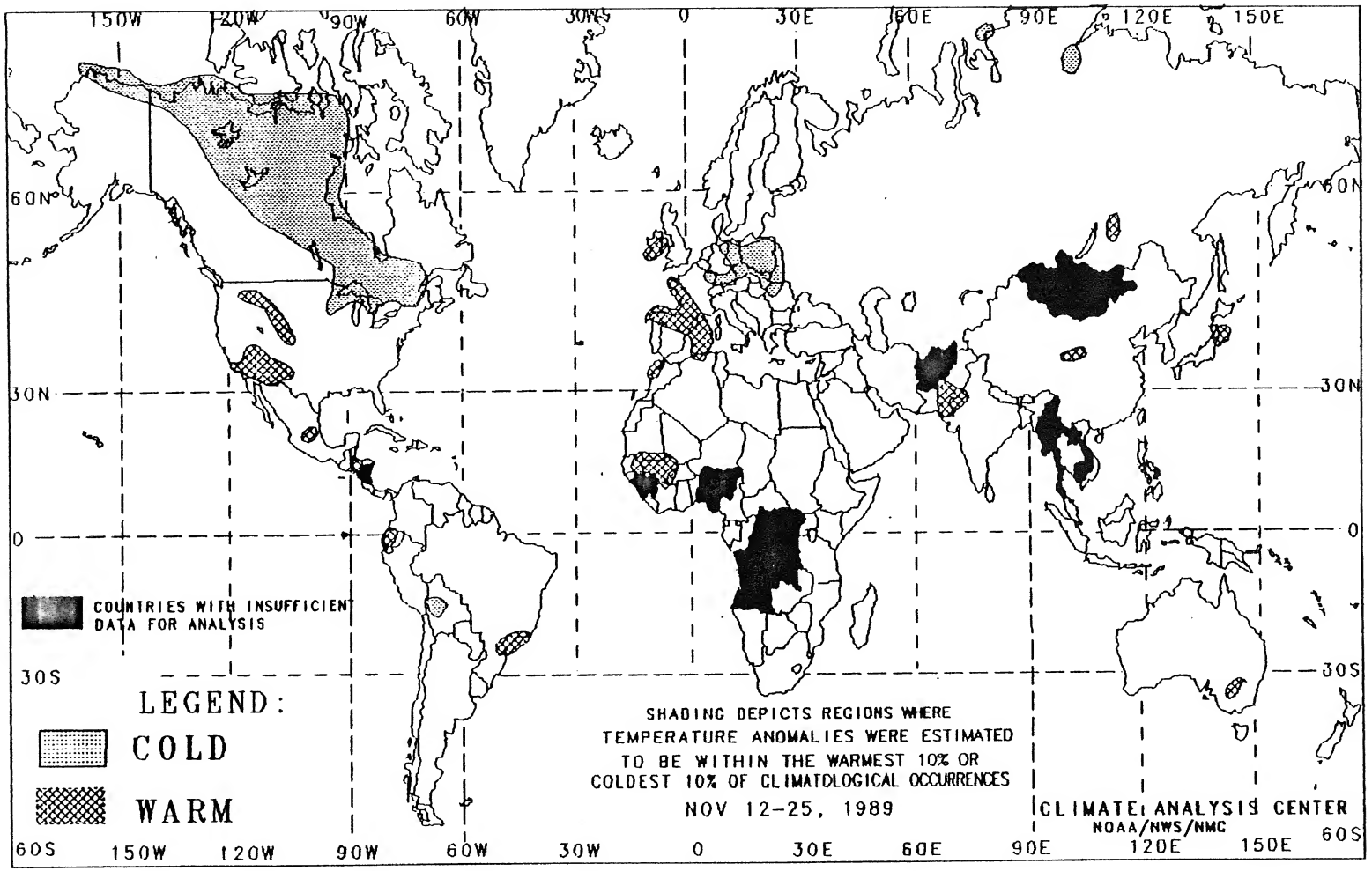




With weekly temperatures averaging between 5°F and 15°F below normal in the northeastern quarter of the country, heating usage surpassed 200 HDD's as far south as the central Appalachians (top). While most of the eastern third of the nation experienced extremely cold conditions and above normal weekly heating demand, unseasonably mild weather in the western half of the U. S. greatly reduced the usual heating demand (bottom).



2 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

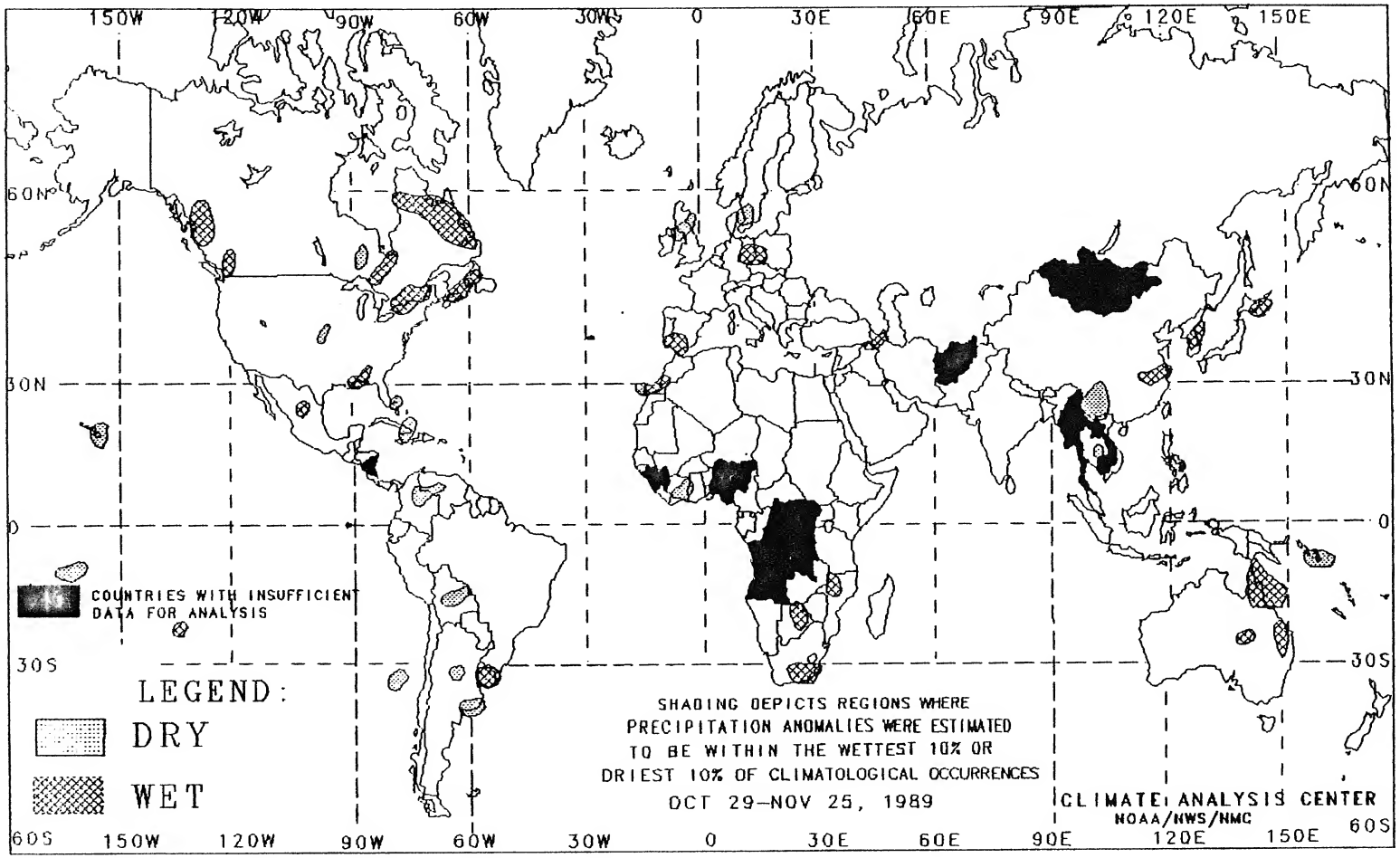
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

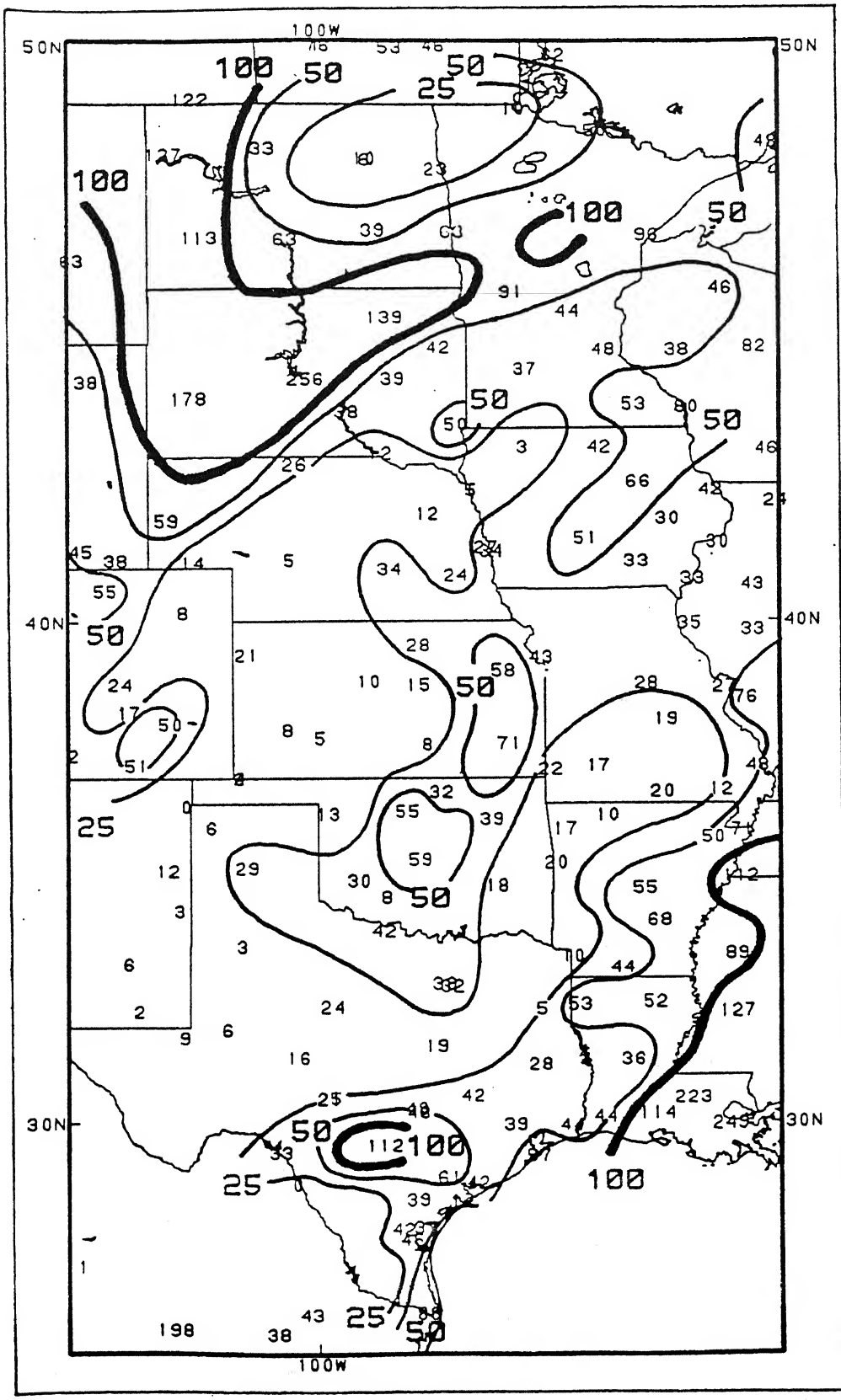
In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

SPECIAL CLIMATE SUMMARY

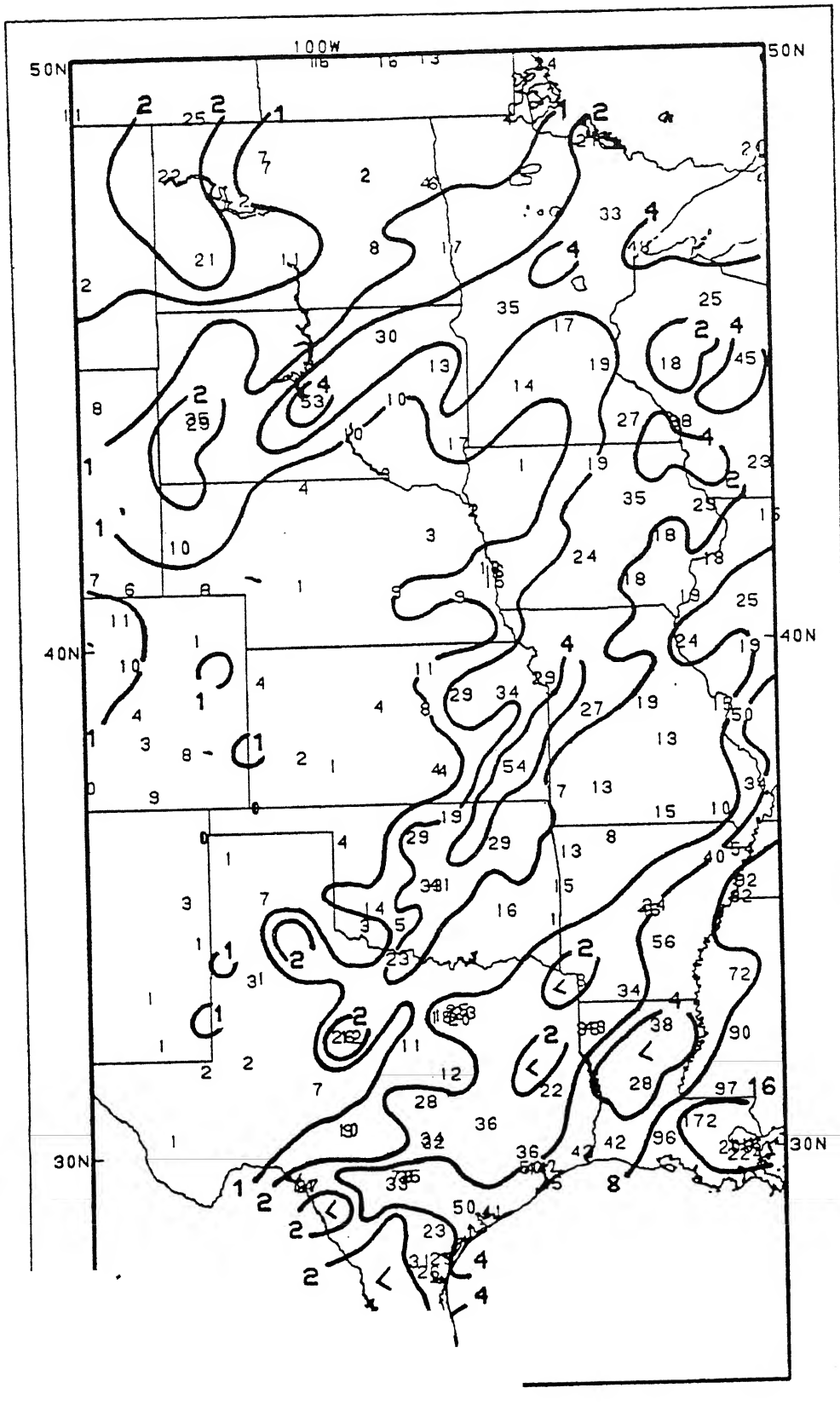
CLIMATE ANALYSIS CENTER, NWS, NMC
NATIONAL WEATHER SERVICE, NOAA, DOC

EXTREMELY DRY CONDITIONS HAVE AFFLICTED THE CENTRAL U.S. SINCE MID-SEPTEMBER



After most of the nation's midsection, particularly the south-central Great Plains and lower Mississippi Valley, received generous rainfall during the late spring and summer months, very little precipitation has occurred across much of the central one-third of the country since mid-September. Even though precipitation in the region normally decreases during the autumn and reaches a minimum during the winter, the amounts accumulated during the past ten weeks are well under half the usual precipitation (see Figure 1). In fact, many locations in the western sections of Nebraska, Kansas, Oklahoma, and Texas as well as parts of the south-central and extreme northern Great Plains have measured less than 25%. Only a few small areas received excess precipitation, and this included the western Dakotas, north-central Minnesota, south-central Texas, and southeastern Louisiana.

Figure 1. Percent of normal precipitation during Sep. 17-Nov. 25, 1989. Isopleths are only drawn for 25, 50, and 100%, and thick contours are the 100% isopleth. Most of the central one-third of the country has received less than half the normal precipitation during the past 10 weeks with the exception of the western Dakotas and south-central Texas. Previously, much of this region experienced unusually wet weather during the late spring and summer months, particularly the south-central Great Plains and the lower Mississippi Valley.



Corresponding precipitation totals during the ten week period are generally under 2 inches (see Figure 2), and some sections of Plains have recorded no measurable precipitation during the first 25 days of November. Since the normal precipitation generally increases from north to south and from west to east, the greatest deficits (between 5 and 7 inches) were observed in the southern Great Plains and lower Mississippi Valley (see Figure 3). Farther north, deficits in the central and northern Great Plains ranged between 2 and 4 inches. According to the long-term Palmer Drought Index as of November 25, much of the nation's midsection experienced near normal subsoil moisture conditions due in part to the extremely wet weather during the late spring and summer months (see Figure 4). Portions of the western Corn Belt and the extreme northern and southern Great Plains, however, have remained in severe to extreme drought as this year's precipitation has been inadequate to completely alleviate long-term dryness from the Drought of 1988.

Figure 2. Total precipitation (inches) during Sep. 17-Nov. 25, 1989. Plotted values are in tenths of inches (e.g. 13 = 1.3 inches) and are either first-order synoptic or airways stations. Supplemental precipitation information was obtained from the River Forecast Centers stations (not plotted), and isohyets are only drawn for 1, 2, 4, 8, and 16 inches. Very little precipitation (generally under 2 inches) has fallen on the Great Plains during the past 10 weeks as excessively dry conditions have developed.

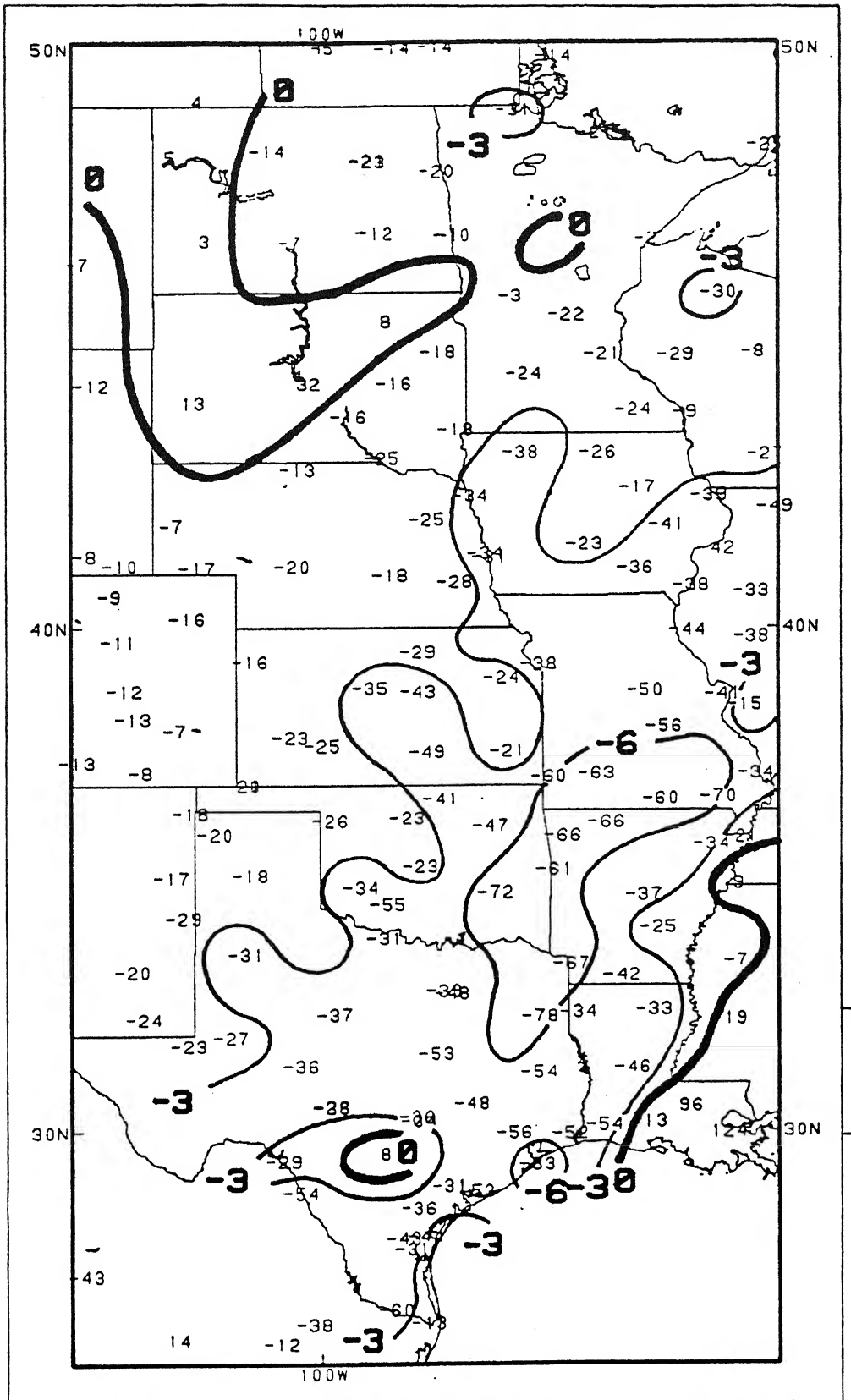


Figure 3. Departure from normal precipitation (inches) during Sep. 17-Nov. 25, 1989. Isopleths are only drawn for 0, -3, and -6 inches, and plotted values are in tenths of inches (e.g. -49 = -4.9 inches). The thick contour represents zero departure. The greatest deficits were located in the southeastern Great Plains and lower Mississippi Valley (over 6 inches) while departures between -2 and -4 inches were common across the central Plains and western Corn Belt.

Topsoil moisture (figure not shown) was short throughout much of the central U.S. This is of concern since the hard red winter wheat crop, completely planted and almost fully emerged, is concentrated in the central Plains (see Figure 5) and currently requires moisture sufficient for growth before it enters the hardened winter stage. Reports from the USDA published in the Weekly Weather and Crop Bulletin (Nov. 25) stated that the lack of precipitation has slowed winter wheat growth in the Great Plains. Above normal temperatures, especially during the past three weeks, and recent high winds have further depleted soil moisture, and rains are needed in Oklahoma and Kansas to promote growth for grazing. The winter wheat crop conditions (for the week ending Nov. 26) in Nebraska, Kansas, Oklahoma, and Texas were as follows:

	VP	*P*	*F*	*G*	*E*
KS	0	22	38	32	8
NE	1	19	69	11	0
OK	0	10	35	55	0
TX	4	34	39	22	1

(*VP* = Very Poor)
(*P* = Poor)
(*F* = Fair)
(*G* = Good)
(*E* = Excellent)

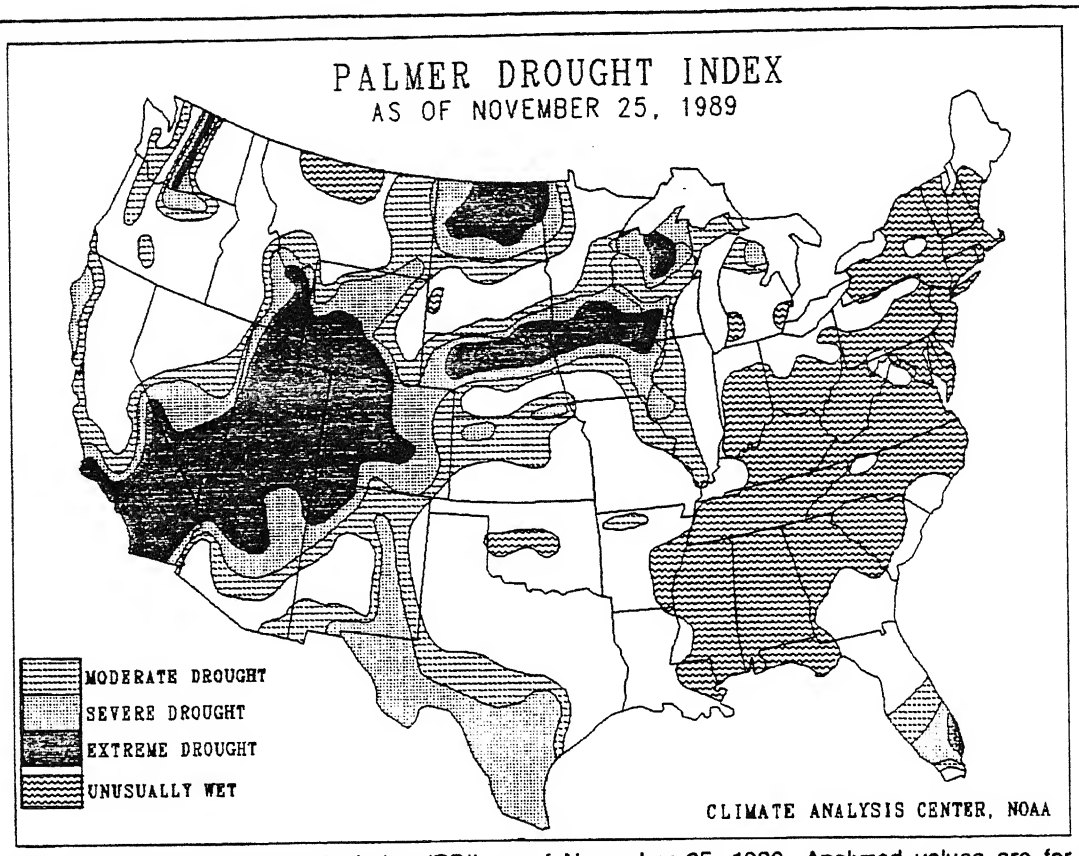


Figure 4. The long-term Palmer Drought Index (PDI) as of November 25, 1989. Analyzed values are for moderate drought (-2> PDI> -3), severe drought (-3> PDI> -4), extreme drought (PDI< -4), and unusually wet (PDI> +2). While severe and extreme drought continued in portions of the western Corn Belt, the extreme northern and southern Plains, and the Southwest, much of the eastern third of the nation has remained extremely wet. Because of excessive rainfall during the late spring and summer months, subsoil moisture conditions in much of the central Plains are near normal although the topsoil moisture is currently short.

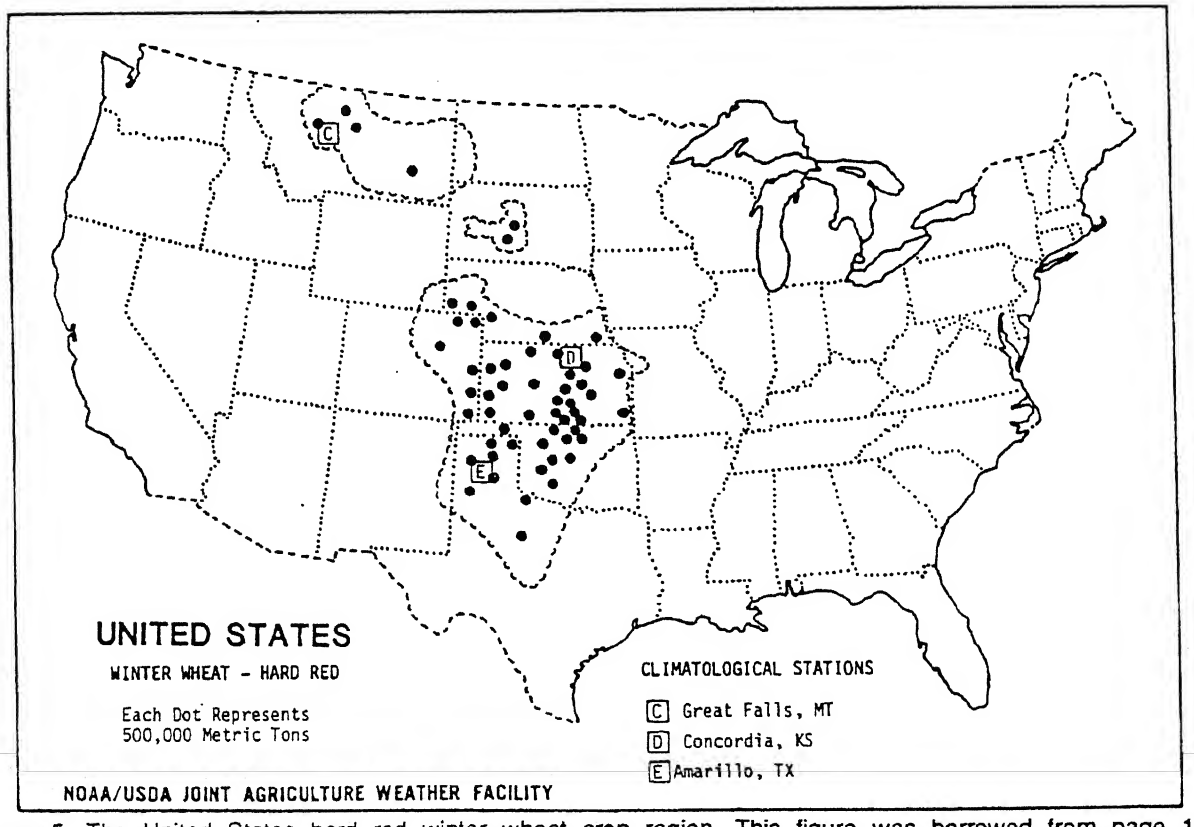


Figure 5. The United States hard red winter wheat crop region. This figure was borrowed from page 132 of "Major World Crop Areas and Climatic Profiles", Agriculture Handbook No. 664, published by the United States Department of Agriculture, the World Agricultural Outlook Board, Washington, D.C., September 1987, 159 pages. Very little precipitation has fallen on the winter wheat crop area during the past 10 weeks, resulting in short topsoil moisture conditions and reduced winter wheat growth.